Hovsepian v. Apple, Inc.
Doc. 248 Att. 3

Exhibit D

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ATSC Digital Television Standard

and

Amendment No.1

Advanced Television Systems Committee

associated audio. The objective is to represent the video, audio, and data sources with as few bits as possible while preserving the level of quality required for the given application.

Although the RF/Transmission subsystems described in this Standard are designed specifically for terrestrial and cable applications, the objective is that the video, audio, and service multiplex/transport subsystems be useful in other applications.

5.2 System block diagram

A basic block diagram representation of the system is shown in Figure 5.1. This representation is based on one adopted by the International Telecommunication Union, Radiocommunication Sector (ITU-R), Task Group 11/3 (Digital Terrestrial Television Broadcasting). According to this model, the digital television system can be seen to consist of three subsystems.[3]

1. Source coding and compression,
2. Service multiplex and transport, and
3. RF/Transmission.

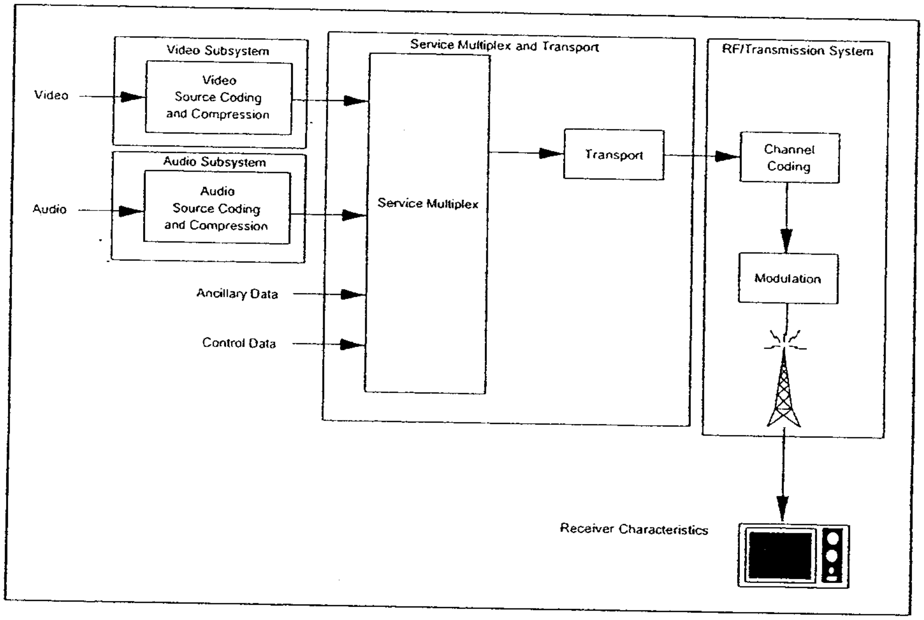
Video Subsystem
Video
Video Source Coding and Compression
Audio Subsystem
Audio
Audio Source Coding and Compression
Ancillary Data
Control Data
Service Multiplex and Transport
Service Multiplex
Transport
RF/Transmission System
Channel Coding
Modulation
Receiver Characteristics

Figure 5.1. ITU-R digital terrestrial television broadcasting model.

"Source coding and compression" refers to the bit rate reduction methods, also known as data compression, appropriate for application to the video, audio, and ancillary digital data streams. The term "ancillary data" includes control data, conditional access control data, and data associated with the program audio and video services, such as closed

[3] ITU-R Document TG11/3-2, "Outline of Work for Task Group 11/3, Digital Terrestrial Television Broadcasting," June 30, 1992.

captioning. "Ancillary data" can also refer to independent program services. The purpose of the coder is to minimize the number of bits needed to represent the audio and video information. The digital television system employs the MPEG-2 video stream syntax for the coding of video and the Digital Audio Compression (AC-3) Standard for the coding of audio.

"Service multiplex and transport" refers to the means of dividing the digital data stream into "packets" of information, the means of uniquely identifying each packet or packet type, and the appropriate methods of multiplexing video data stream packets, audio data stream packets, and ancillary data stream packets into a single data stream. In developing the transport mechanism, interoperability among digital media, such as terrestrial broadcasting, cable distribution, satellite distribution, recording media, and computer interfaces, was a prime consideration. The digital television system employs the MPEG-2 transport stream syntax for the packetization and multiplexing of video, audio, and data signals for digital broadcasting systems.[4] The MPEG-2 transport stream syntax was developed for applications where channel bandwidth or recording media capacity is limited and the requirement for an efficient transport mechanism is paramount. It was designed also to facilitate interoperability with the ATM transport mechanism.

"RF/Transmission" refers to channel coding and modulation. The channel coder takes the data bit stream and adds additional information that can be used by the receiver to reconstruct the data from the received signal which, due to transmission impairments, may not accurately represent the transmitted signal. The modulation (or physical layer) uses the digital data stream information to modulate the transmitted signal. The modulation subsystem offers two modes: a terrestrial broadcast mode (8 VSB), and a high data rate mode (16 VSB).

Figure 5.2 illustrates a high level view of encoding equipment. This view is not intended to be complete, but is used to illustrate the relationship of various clock frequencies within the encoder. There are two domains within the encoder where a set of frequencies are related, the source coding domain and the channel coding domain.

[4] Chairman, ITU-R Task Group 11/3, "Report of the Second Meeting of ITU-R Task Group 11/3, Geneva, October 13-19, 1993," January 5, 1994, p. 40.